INEL

Idaho National Engineering Laboratory

Environmental Restoration

June 1992

Final Work Plan For The Organic Contamination In The Vadose Zone

Operable Unit 7-08 Focused Remedial Investigation/Feasibility Study

WAG 7 INFORMATION ONLY

EG&G Idaho, Inc.

U. S. Department of Energy, Idaho Field Office

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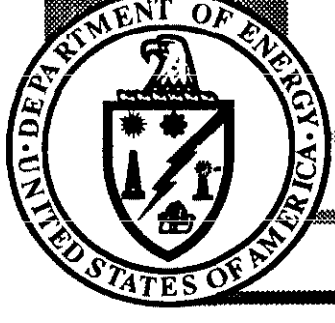

EG&G idaho, inc.

Idaho National Engineering Laboratory

U.S. Department of Energy, Idaho Field Office

EGG-WM-10049
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Revision 1

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National
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Prepared for the
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
Under DOE Idaho Field Office

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ABSTRACT

This is the *Work Plan for the Organic Contamination in the Vadose Zone (OCVZ) Operable Unit 7-08 (OU 7-08) Focused Remedial Investigation/Feasibility Study (RI/FS)* (EGG-WM-10149).

The objectives of the OCVZ remedial investigation/feasibility study (RI/FS) are to (a) determine the extent of the volatile organic contamination in the vadose zone beneath and adjacent to the SDA, (b) evaluate the risk posed to the public to the environment by the release of volatile organics to the atmosphere and groundwater, and (c) select the best remediation alternative based on the nine Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) criteria. Characterization activities have been developed to assist in the fulfillment of these RI/FS objectives. The objectives of the characterization activities are to (a) estimate the rate of release of volatile organic vapors from the buried waste at the Subsurface Disposal Area (SDA), (b) define the nature and extent of vapor plumes in the vadose zone beneath the SDA, (c) determine the volatile organic flux to the atmosphere and groundwater, (d) determine the transport parameters in the vadose zone and aquifer, (e) measure the organic contamination in the groundwater and perched water below and surrounding the SDA, and (f) provide a sufficient quantity of quality data to prepare the baseline risk assessment for this operable unit.

EXECUTIVE SUMMARY

On November 1989 the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering Laboratory (INEL) was placed on the National Priorities List and became subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). During 1990-1991, an action plan was negotiated between the Department of Energy (DOE), the State of Idaho, and the Environmental Protection Agency (EPA), to implement the INEL Federal Facility Agreement and Consent Order. The INEL has been divided into 10 waste area groups (WAGs) to facilitate the remediation process. Each WAG is further divided into operable units (OUs) that focus on specific concerns. The Organic Contamination in the Vadose Zone (OCVZ) Operable Unit (OU 7-08) is in WAG 7, which covers the RWMC at INEL. The State of Idaho was granted regulatory jurisdiction over the WAG 7 site under the Resource Conservation and Recovery Act and CERCLA and will be the lead regulatory agency during the characterization and alternative evaluation phases that will be conducted by DOE.

The purpose of the work plan is to provide the management framework and identify the requirements for conducting the Focused Remedial Investigation and Feasibility Study (RI/FS). The OCVZ Operable Unit is defined as volatile organic compound (VOC) contamination in the vadose zone beneath and adjacent to the Subsurface Disposal Area (SDA). The vadose zone begins at the ground surface and extends to the top of the Snake River Aquifer. VOCs are assumed to be released to the atmosphere and the aquifer. Characterization of the aquifer is important to the OCVZ Focused RI/FS, however, the aquifer is covered by the Groundwater Operable Unit. The modeling for migration of VOCs includes the waste disposal pits as sources of release to the vadose zone. However, these pits are treated as separate operable units that are not to be included with potential remediation efforts for the vadose zone operable unit that extends 1,000 ft beyond the boundaries of the SDA. The objectives of the OCVZ Focused RI/FS are to (a) determine the extent of the volatile organic contamination in the vadose zone beneath and adjacent to the SDA, (b) determine the current and future risk posed by VOCs to human health and the environment, (c) conduct treatability studies to develop and evaluate candidate remediation technologies, and (d) develop the appropriate remedial alternative based on the nine CERCLA criteria. A remedial investigation/baseline risk assessment will be completed to assess the extent of the VOC contamination and to determine the current and future risks to human health and the environment. Site characterization studies for the RI have been initiated. A feasibility study will then be conducted to develop and recommend specific remedial alternatives using the nine CERCLA criteria. The proposed plan will present the preferred remedial alternative and other options. The remedial alternative will be selected in the record of decision.

A discussion of the INEL in terms of its location, history, meteorology, geology, surface water hydrology, groundwater hydrology, vadose zone, biota, demography, and land use is provided in the OCVZ work plan.

A presentation of the existing data (Note: Data are reported in different units depending on the historical period in which the data was collected. Refer to the conversion chart following the acronym list for unit relationships.) for each media is provided in the work plan. Volatile organic contamination has been detected in the vadose zone. Chemical-specific action levels do not exist for the vadose zone, therefore, a risk assessment will be required to develop action levels. Groundwater sampling at the SDA indicated evidence of past carbon tetrachloride contamination slightly above the Environmental Protection Agency (EPA) drinking water standard of 5 $\mu g/m^3$ (ppb). Present groundwater samples have not been found above drinking water standards since 1987. No evidence

of surface water VOC contamination above acceptable levels has been discovered. Based on the physical setting and the present knowledge of the extent of VOC contamination, a conceptual model of contaminant migration pathways has been developed.

The OCVZ work plan identifies potential applicable or relevant and appropriate requirements, preliminary remedial alternatives, and the conceptual site model.

Data-use requirements and data quality objectives that will allow the remedial action objectives to be met are identified in the work plan. The identified data gaps and data quality objectives were used to prepare a recommended site characterization program at the SDA for each media (e.g., air, groundwater, and vadose zone.)

The working schedule is provided in the work plan. Major assumptions built into the schedule include having adequate funding and resources available immediately to carry out an accelerated program, having adequate laboratory facilities available to carry out an accelerated program within the data quality requirements of CERCLA, and meeting documentation review requirements. Attached to the work plan are various plans that provide the procedures for implementing the project. They are as follows:

- *National Environmental Policy Act (NEPA) Integration Plan.* The NEPA integration plan outlines the procedures required under DOE Order 5400.4 to integrate NEPA and CERCLA into a single process.

- *Community Relations Plan.* The community relations plan describes the process for identifying community concerns and issues, and provides guidance for current and future actions to address those concerns. The plan identifies all of the planned community relations activities during the project.

- *Health and Safety Plan.* The health and safety plan identifies the procedures and organization that will be implemented during the project to ensure that activities are executed in a manner that protects workers, the public, and the environment.

- *Sampling and Analysis Plan.* The sampling and analysis plan develops the rationale and methodology for all of the environmental sampling that will be performed during the remedial investigation. It specifies the number of samples that will be taken in each medium and for the purposes of quality control, as well as the type of lab analyses to be performed for each sample. The procedures for taking the samples are appended to the sampling and analysis plan as standard operating procedures. The quality assurance project plan is part of the sampling and analysis plan.

- *Data Management Plan.* The data management plan describes the procedures that will be used to document and track the investigation data results, describe project file and reporting requirements, and identify organizational and individual responsibilities for data management. The scope of the data management plan encompasses all data gathering, analysis, control, validation, and inventory tasks associated with the Focused RI/FS project.

CONTENTS

FIGURES

TABLES

1. Introduction

Final Work Plan for the Organic Contamination in the Vadose Zone Operable Unit (OU 7-08) Focused Remedial Investigation/Feasibility Study

1. INTRODUCTION

The Idaho National Engineering Laboratory (INEL) is a Government-owned reservation managed by the U.S. Department of Energy (DOE). The Radioactive Waste Management Complex (RWMC) at the INEL has received radioactively contaminated solid waste for disposal since the early 1950's. In November 1989, the RWMC was placed on the National Priorities List and became subject to the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). During 1990-1991, an action plan was negotiated between DOE, the State of Idaho, and the U.S. Environmental Protection Agency (EPA) to implement the INEL Federal Facility Agreement and Consent Order. The INEL has been divided into 10 waste area groups (WAGs) to facilitate the remediation process. Each WAG is further divided into operable units (OUs) that focus on specific concerns. The Organic Contamination in the Vadose Zone (OCVZ) Operable Unit (OU 7-08) is in WAG 7, which covers the RWMC. The State of Idaho was granted regulatory jurisdiction over the WAG 7 site and will be the lead regulatory agency during the characterization and alternative evaluation phases that will be conducted by DOE.

On July 8, 1952, solid wastes were first deposited in the pits and trenches at the Subsurface Disposal Area (SDA) at the RWMC. From 1966 to 1970, approximately 88,400 gal of organic waste from the DOE Rocky Flats Plant (located in Colorado) were disposed at the SDA. The organic waste included 24,000 gal of carbon tetrachloride and 25,000 gal of other volatile chlorinated hydrocarbons; the remainder is machine oil and calcium silicate adsorbent.

Volatile organic compounds (VOCs) were first detected in the groundwater in September 1987 as the result of sampling by the U.S. Geological Survey. The Snake River Plain Aquifer is located approximately 600 ft below land surface. Carbon tetrachloride was the only detected compound to exceed its EPA drinking water standards of 5 µg/L. Organic vapors were later detected during well drilling operations in the SDA. Analysis of vapors from the drilling showed the presence of carbon tetrachloride, tetrachloroethylene, trichloroethylene (TCE), and 1,1,1-trichloroethane.

A soil-gas survey confirmed that the SDA disposal pits were a source of the organic vapors. In the soil gas survey, concentrations of VOCs were found as high as 2300 ppm in the soil at 30 in. below the surface. No gas measurements have been made in the soil below 30 in. near the contaminated trenches.

EG&G Idaho, Inc., conducted two on-site field tests to demonstrate the effectiveness of the vapor vacuum extraction (VVE) process for removing the VOCs from the vadose zone. A two-week test was performed during November 1989 and a four-month test was performed from April 12, 1990, to August 13, 1990. During the four-month test, the VVE system extracted 65-million cubic feet of soil gas from beneath the RWMC, 429 kg of which were carbon tetrachloride and 163 kg of which

were TCE. The VVE remedial technology is being considered a viable means for removing the VOCs from the vadose zone beneath the SDA.

This remedial investigation/feasibility study (RI/FS) work plan was prepared following EPA CERCLA process and the FFA/CO.

1.1 Work Plan Scope

The purpose of the work plan is to provide the management framework and identify the requirements for conducting the RI/FS. The OCVZ Operable Unit is defined as VOC contamination in the vadose zone beneath and adjacent to the SDA. The vadose zone begins at the ground surface and extends to the top of the Snake River Aquifer. VOCs are assumed to be released to the atmosphere and the aquifer. Characterization of the aquifer is important to the OCVZ Focused RI/FS, however, the aquifer is covered by the Groundwater Operable Unit. The modeling for migration of VOCs includes the waste disposal pits as sources of release to the vadose zone. However, these pits are treated as separate operable units that are not to be included with potential remediation efforts for the vadose zone operable unit that extends 1,000 ft beyond the boundaries of the SDA. The objectives of the OCVZ Focused RI/FS are to (a) determine the extent of the volatile organic contamination in the vadose zone beneath and adjacent to the SDA, (b) determine the current and future risk posed by VOCs to human health and the environment, (c) conduct treatability studies to develop and evaluate candidate remediation technologies, and (d) develop the appropriate remedial alternative based on the nine CERCLA criteria. Site characterization studies for the remedial investigation will be initiated. A remedial investigation/baseline risk assessment will be completed to assess the extent of the VOC contamination and to determine the current and future risks to human health and the environment. A feasibility study will then be conducted to develop and recommend specific remedial alternatives using the nine CERCLA criteria. The proposed plan will present the preferred remedial alternative and other options. The remedial alternative will be selected in the record of decision.

1.2 Work Plan Organization

The OCVZ Focused RI/FS Work Plan is written as a handbook for persons responsible for implementing the activities outlined. The OCVZ Focused RI/FS Work Plan contains a discussion of the background and history of the SDA. It presents a plan for the investigation of the extent of the VOCs contamination in the vadose zone beneath and adjacent to the SDA. These plans present the activities that will be performed in site characterization investigations.

Supporting data and implementation plans are presented as attachments I through V to the OCVZ Focused RI/FS Work Plan. These plans contain the procedures necessary for implementation of field sampling activities, management of data, communication with the public, and protection of human health.

The RI/FS work plan contains the sections and appendices summarized below:

- Section 2 provides a description of the INEL Site and the SDA. Specific discussions address the history of organic waste disposal operations, previous investigations and remedial activities, and the physical setting of the site.

- Section 3 presents a conceptual model of contamination migration at the SDA developed during scoping activities. Descriptions of existing site conditions, potential migration and exposure pathways, and a preliminary assessment of human health and environmental impacts are provided.

- Section 4 presents the RI/FS work plan rationale. Data use requirements and data quality objectives are given. These requirements and objectives are incorporated into plans containing recommendations for characterizing and monitoring the extent of contamination during the CERCLA remedial investigation.

- Section 5 describes RI/FS project activities. Included in this section are specific tasks that will be conducted.

- Section 6 presents a schedule for completion of the RI/FS.

- Section 7 contains the project management plan. This plan defines project organizational relationships and responsibilities, documentation requirements, and financial and project tracking requirements.

- Attachment I contains the integration plan for the National Environmental Policy Act (NEPA) and CERCLA. This plan details activities that will be performed specifically to address the requirements of NEPA.

- Attachment II contains the community relations plan. The community relations plan provides an established means of addressing community concerns.

- Attachment III contains the health and safety plan. This plan describes the policies and procedures that will be implemented to protect site workers and visitors from potential hazards associated with remedial investigation activities.

- Attachment IV contains the sampling and analysis plan. This plan describes how individual sampling activities will be conducted during the RI/FS. The quality assurance plan is attached to the sampling and analysis plan and describes the requirements to ensure that sampling activities are conducted in a manner to produce defensible data. Detailed field sampling plans for the CERCLA remedial investigation will be prepared and attached at a future date.

- Attachment V contains the data management plan. This plan provides procedures and requirements necessary to develop a relevant and accurate data base on organic contamination beneath the SDA. It identifies responsibilities for data collection, validation, and management.

1.3 NEPA/CERCLA Integration

All potential projects involving any Federal agency must undergo a review in accordance with NEPA to identify and evaluate potential environmental impacts. To meet the requirements of NEPA and DOE Order 5440.1D and DOE-Idaho Order 5400.4, environmental documentation must be prepared for all new programs or research and development projects that have the potential for affecting the environment. Details of this integration are presented in Attachment I.